UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/553,784	08/04/2006	Massimo Malavasi	108907-00043	3967

4372 7590 11/03/2010

ARENT FOX LLP
1050 CONNECTICUT AVENUE, N.W.
SUITE 400
WASHINGTON, DC 20036

EXAMINER	
LAUX, DAVID J	

ART UNIT	PAPER NUMBER
3743	

NOTIFICATION DATE	DELIVERY MODE
11/03/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

DCIPDocket@arentfox.com
IPMatters@arentfox.com
Patent_Mail@arentfox.com

Office Action Summary	Application No.	Applicant(s)	
	10/553,784	MALAVASI ET AL.	
	Examiner	Art Unit	
	David J. Laux	3743	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10/05/10*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6,7,10-18,21,22 and 24-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6,7,10-18,21,22 and 24-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This action is in response to applicant's submission dated 10/05/2010. Claim(s) 1-4, 6-7, 10-18 & 21-22, 24-29 is/are pending.

Response to Arguments

1. Applicant's arguments filed 10/05/2010 have been fully considered but they are not persuasive.

2. Applicant first argues that '288 fails to disclose total organic compounds in the order of parts per million. As discussed further below, it is inherent that the total organic compounds (TOCs) are in the order of parts per million (ppm) because ppm is a unit of measure. Whether the amount of TOCs is 0 ppm or 1 million ppm, it is inherent that the amount of TOCs is in the order of ppm.

3. Applicant also argues that '288 fails to disclose the reduction to a negligible value the fraction of dust that is entrained out of the reactor with the burnt gases. Examiner disagrees. In one embodiment, '288 further reduces the fraction of dust that is entrained out of the reactor with the burnt gases with the use of a cyclonic separator (abstract; Col. 4, lines 8-13, 27-33; Col. 11, lines 33-37; amount of dust emanating from the reactor is a negligible amount; particulates are "substantially completely" removed by the cyclonic separator).

4. Furthermore, examiner disagrees with applicant's characterization that '288 requires the use of a cyclonic separator. '288 discloses that "the resulting gases may contain a very small concentration of incombustible particulate solids" (Col. 11, lines 33-35). To some, this very small concentration would be a negligible amount for which

additional particulate removal steps (such as the use of a cyclonic separator) are unnecessary.

5. Applicant further argues that '254 to Munk cannot be combined with '288 because '254 teaches that NOx cannot be reduced at the high temperatures disclosed by '288, and so there would be no motivation to combine because the process taught by '254 would be ineffective. Applicant has not cited a passage in '254 making this claim, so it is unclear to examiner why applicant has made such a claim.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-2, 7, 10 & 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 4,850,288 to Hoffert et al in view of US 5,326,254 to Munk.

8. '288 discloses a method for the treatment of materials, in particular waste materials and refuse, comprising: supplying the material to be treated and a combustion supporter to a combustion reactor (15) (Col. 5, lines 61-66; Col. 6, lines 11-14), wherein the combustion supporter comprises oxygen (Col. 6, lines 11-14; air inherently contains approximately 21% oxygen); and discharging gases produced during the oxidation or combustion of the material from the oxidation chamber or combustion reactor (15) (Col. 6, lines 41-45), wherein the material to be treated and the products resulting from the oxidation or combustion are subjected to conditions of isothermy or quasi-isothermy at

high or very high temperature (Col. 4, lines 21-23), without substantial oxygen deficit (Col. 6, lines 38-40), in any part of the reactor (15), wherein the oxidation chamber or combustion reactor is operated at a pressure from greater than atmospheric pressure to 600 kPa (Col. 6, 36-38), wherein a fraction of dust that is entrained out of the reactor (15) with combustion fumes is reduced to a negligible value (abstract; Col. 4, lines 8-13, 27-33; Col. 11, lines 33-37; applicant states in paragraph 3 on page 14 that a temperature of about 1500°C is sufficient to turn any non-combustibles into slag and the combustion apparatus of '288 discloses an operating temperature of 2700°F-2800°F; Col. 12, lines 53-57), and wherein total organic carbon in combustion fumes at a mouth of the reactor is of the order of parts per million (it is inherent that the total organic carbon in the combustion fumes will be in the order of parts per million, from 0 to 1 million, since parts per million is simply a unit of measure).

9. '288 fails to disclose recycled gases being supplied to the combustion reactor or water being injected into the recycled gases to raise the concentration of water in the recycled gases. '254 teaches recycling flue gases to a combustion chamber (Col. 2, lines 60-67) and water being injected into the recycled gases to raise the concentration of water in the recycled gases (Col. 1, line 66 – Col. 2, line 8). It would have been obvious for one skilled in the art at the time of invention to combine the combustion apparatus of '288 with the flue gas humidification/recirculation of '254 because such a combination would have produced the added benefit of reduced NOx emissions and a more efficient combustion process.

10. '288 as combined with '254 teaches the claimed invention except for the concentration of water in the recycled gases being higher than 30% per volume. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the concentration of water in the recycled gases being higher than 30% per volume, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

11. With regard to claims 2 & 7, '254 further teaches the supply of a combustion supporter comprising oxygen mixed with gases resulting from the combustion, with water, or with a combination of gases and water, to bring about a high degree of opacification of the combustion supporter and to ensure almost instantaneous heating of the combustion supporter that is supplied into the reactor (Col. 2, lines 60-67; it is well-known in the art, and applicant admits on page 5 of the specification, that the addition of water or steam to the products of combustion renders them opaque to infra-red), wherein the recycled gases which ensure thermal balance are constituted wholly or partially by steam (Col. 1, line 66 – Col. 2, line 8). It would have been obvious for one skilled in the art at the time of invention to combine the combustion apparatus of '288 with the flue gas recirculation of '254 because such a combination would have produced the added benefit of reduced NOx emissions and increased opacity to infrared, which is known to increase the overall efficiency of the combustion system.

12. With regard to claim 10, '288 further discloses a method wherein in the reactor, the high rate of heating of the combustible material, in particular of its solid fraction, reduces to negligible value a fraction of dust that is entrained out of the reactor with the

burnt gases (applicant states in paragraph 3 on page 14 that a temperature of about 1500°C is sufficient to turn any non-combustibles into slag and the combustion apparatus of '288 discloses an operating temperature of 2700°F-2800°F; Col. 12, lines 53-57).

13. Claims 3-4, 6, 12-13 & 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over '288 in view of '254 as applied to claims 1-2 above, and further in view of US 6,848,375 to Kasin.

14. With regard to claims 3-4 & 29, '288 as combined with '254 fails to disclose the recycled gases from combustion are supplied at minimized flow-rate and/or temperature so as to minimize the overall volume of gas in the reactor for gas residence time in the reactor and to ensure the removal of a reaction heat from the reactor, wherein the mixing of the oxygen with the recycled combustion gases takes place with a concentration of more than 10% by volume and preferably more than 60% by volume, wherein the recycled gases which ensure the thermal balance of a plant that is operated continuously by removing the excess reaction heat owing to an appreciable heat enthalpy difference between the input and the output of the reactor are recycled at a minimum temperature that is compatible with normal cooling means, wherein the minimum temperature is above the dew point of the recycled gases. '375 teaches the recycled gases from combustion are supplied at minimized temperature (Col. 4, lines 38-40) so as to minimize the overall volume of gas in the reactor for gas residence time in the reactor and to ensure the removal of a reaction heat from the reactor, wherein the mixing of the oxygen with the recycled combustion gases takes place with a

concentration of more than 10% by volume and preferably more than 60% by volume (Col. 8, lines 48-54), wherein the recycled gases which ensure the thermal balance of a plant that is operated continuously by removing the excess reaction heat owing to an appreciable heat enthalpy difference between the input and the output of the reactor are recycled at a minimum temperature that is compatible with normal cooling means (Col. 4, lines 38-40), wherein the minimum temperature is above the dew point of the recycled gases (Col. 4, lines 38-40). It would have been obvious for one skilled in the art at the time of invention to combine the combustion apparatus of '288 as combined with '254 with the flue gas recycled percentages of '375 because such a combination would have produced the added benefit of the optimal amount of exhaust gas recycled without unacceptably reducing the performance of the combustion apparatus.

15. With regard to claims 12 & 13, '288 as combined with '254 fails to disclose a MIMO (multiple input/multiple output) control and optimization procedure which is focused on the parameters at the output of the reactor and in particular on measurement of gas composition at the output of the reactor, wherein the measurements of the gas composition are implemented with characteristic response times of about 2 seconds. '375 teaches a MIMO (multiple input/multiple output) control and optimization procedure which is focused on the parameters at the output of the reactor and in particular on measurement of gas composition at the output of the reactor (Col. 12, lines 14-20), wherein the measurements of the gas composition are implemented with characteristic response times of about 2 seconds (Col. 12, lines 16-18; discloses continuous response times). It would have been obvious for one skilled in

the art at the time of invention to combine the combustion apparatus of '288 as combined with '254 with the combustion data controller of '375 because such a combination would have produced the added benefit of an automated combustion process with ideal combustion conditions to maximize efficiency and reduce the creation of pollutants. Furthermore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a response time of about 2 seconds, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

16. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over '288 in view of '254 as applied to claims 1-2 above, and further in view of US 4,022,591 to Staudinger.

17. '288 as combined with '254 fails to disclose the fused slag being cooled and solidified into beads so as to ensure that toxic heavy metals contained in the incombustible slag are rendered completely inert. '591 teaches fused slag being cooled and solidified into beads (Col. 2, lines 48-53; applicant states in the first full paragraph on page 12 that the quenching in a water bath solidifies the beads, rendering them inert) so as to ensure that toxic heavy metals contained in the incombustible slag are rendered completely inert. It would have been obvious for one skilled in the art at the time of invention to combine the combustion apparatus of '254 as combined with '288 with the slag quencher of '591 because such a combination would have produced the added benefit of a means for disposing the liquid slag present in the combustion chamber in a safe and environmentally friendly way and would also have the added

benefit of replacing the clean-out tube (17a, mistakenly as 7a in Fig. 1) of '288 with a completely sealed quench chamber which would prevent potentially dangerous splashing of the liquid slag to occur.

18. Claims 14, 16, 18, 21-22 & 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over '288 in view of '254, and further in view of US 6,883,443 to Rettig et al.

19. '288 discloses an apparatus for the treatment of materials, in particular waste materials and refuse, comprising: a combustion reactor (15) to which the material to be treated can be supplied (Col. 5, lines 61-66) comprising: an input (18) for a combustion supporter comprising oxygen (Col. 6, lines 11-14); an output (20a) for the gases produced during the combustion of the above-mentioned material inside the reactor (15) (Col. 6, lines 41-45), wherein the combustion reactor (15) is substantially isothermic or quasi-isothermic in use at high or very high temperature (Col. 4, lines 21-23), and without substantial oxygen deficit (Col. 6, lines 38-40), in all of its parts, wherein the combustion reactor (15) is operated at a pressure from greater than atmospheric pressure to 600 kPa (Col. 6, lines 36-38), wherein a fraction of dust that is entrained out of the reactor (15) with combustion fumes is reduced to a negligible value (abstract; Col. 4, lines 8-13, 27-33; Col. 11, lines 33-37; applicant states in paragraph 3 on page 14 that a temperature of about 1500°C is sufficient to turn any non-combustibles into slag and the combustion apparatus of '288 discloses an operating temperature of 2700°F-2800°F; Col. 12, lines 53-57), and wherein total organic carbon in combustion fumes at a mouth of the reactor is of the order of parts per million (it is inherent that the total

organic carbon in the combustion fumes will be in the order of parts per million, from 0 to 1 million, since parts per million is simply a unit of measure).

20. '288 fails to disclose water being injected into recycled gases to raise the concentration of water in the recycled gases. '254 teaches water being injected into the recycled gases to raise the concentration of water in the recycled gases (Col. 1, line 66 – Col. 2, line 8). It would have been obvious for one skilled in the art at the time of invention to combine the combustion apparatus of '288 with the flue gas humidification/recirculation of '254 because such a combination would have produced the added benefit of reduced NOx emissions and a more efficient combustion process.

21. '288 as combined with '254 teaches the claimed invention except for the concentration of water in the recycled gases being higher than 30% per volume. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the concentration of water in the recycled gases being higher than 30% per volume, since it has been held that discovering an optimum value as a result effective variable involves only routine skill in the art.

22. '288 fails to specifically disclose the quench gas being recirculated flue gas. '443 teaches the use of recirculated flue gas as a quench gas (Col. 5, line 65 – Col. 6, line 11). It would have been obvious for one skilled in the art at the time of invention to combine the combustion gas quenching means of '288 with the use of recirculated flue gas as the quench gas of '443 because such a combination would have produced the added benefit of an efficient and readily available means of reducing the temperature of

the combustion gases to a useable level with the added benefit of not diluting or increasing the volume of the flue gases.

23. With regard to claim 16, '288 further discloses a means (30) for cooling the gases produced during combustion (Col. 8, lines 1-5). '288 fails to disclose a means for withdrawing and recycling a portion of the said cooled gases being provided for mixing the oxygen at the input to the reactor and producing a combustion-supporting mixture which is opaque to infra-red. '254 teaches a means (230) for withdrawing and recycling a portion of flue gases being provided (Col. 2, lines 60-67) for mixing the oxygen at the input to the reactor and producing a combustion-supporting mixture (Col. 2, lines 64-67) which is opaque to infra-red (it is well-known in the art, and applicant admits on page 5 of the specification, that the addition of water or steam to the products of combustion renders them opaque to infra-red). It would have been obvious for one skilled in the art at the time of invention to combine the combustion apparatus of '288 with the flue gas recirculation of '254 because such a combination would have produced the added benefit of reduced NOx emissions and increased opacity to infrared, which is known to increase the overall efficiency of the combustion system.

24. With regard to claim 18, '288 further discloses a means (30) for mixing a quench gas with the gases output from the reactor prior to entry of the gases into the cooling means (Col. 8, lines 1-5).

25. With regard to claim 21, '288 discloses the claimed invention except for a plurality of feeders for supplying different materials to the reactor. It would have been obvious to one having ordinary skill in the art at the time the invention was made to add

an additional number of feeders to supply materials to the reactor, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art.

26. With regard to claim 22, '288 further discloses at least one propulsion chamber for the pressurized and discontinuous supply of solid materials in pieces into the reactor (Col. 10, lines 35-39), said propulsion chamber comprising a duct (117) for the supply of gas under pressure (Col. 10, lines 35-39). '288 fails to disclose the pressurized gas being withdrawn from the output line. '288 does, however, contemplate the use of flue gases to preheat the solid fuel in the pressurized conduit through the use of a heat exchanger (Col. 10, lines 50-54). Given the exhaust gas/steam recirculation method taught by '254, it would have been obvious to replace the indirect method of preheating the fuel with a direct injection of the flue gas/steam recirculated gases because such a combination would have produced the added benefit of a more efficient way to inject the gases and fuel and would have allowed for a better mixing of the products upon entry into the combustion chamber by pre-mixing them in a fuel feed/flue gas recirculation chamber.

27. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over '288 in view of US 6,145,452 to Heger et al.

28. Although '288 discloses the walls of the combustion chamber being made of a refractory material (Col. 5, lines 56-60), '288 fails to specifically disclose the walls of the reactor comprising a ceramic lining material which participates in the isothermy or quasi-isothermy of the reactor. '452 teaches walls of a reactor comprising a ceramic

lining material which participates in the isothermy or quasi-isothermy of the reactor (Abstract). It would have been obvious for one skilled in the art at the time of invention to combine the combustion apparatus of ‘288 with the ceramic insulation of ‘452 because the ceramic insulation of '452 is capable of withstanding temperatures of over 3000°F which the combustion chamber of '452 requires and could have been used instead of the unspecified refractory material of disclosed by '452.

29. Claims 17 & 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over ‘288 in view of ‘254 as applied to claim 16 above, and further in view of ‘375.

30. ‘288 as combined with ‘254 fails to disclose the cooling means comprising means for recovering energy from a high enthalpy value of the gases output from the reactor or a sensor means for measuring output parameters of the reactor, a control and management system receiving the signals of the sensor means in order substantially to improve the number of effective predictions for intervention in the operating conditions of the plant and to control fluctuations due to the non-homogeneity of the materials that are supplied into the reactor. '375 teaches a cooling means comprising means (71) for recovering energy from a high enthalpy value of the gases output from the reactor (Col. 7, lines 48-50) and a sensor means for measuring output parameters of the reactor (Col. 12, lines 14-20), a control and management system receiving the signals of the sensor means in order substantially to improve the number of effective predictions for intervention in the operating conditions of the plant and to control fluctuations due to the non-homogeneity of the materials that are supplied into the reactor (Col. 12, lines 14-20). It would have been obvious for one skilled in the art at the time of invention to

combine the combustion apparatus of '288 as combined with '254 with the control system of '375 because such a combination would have produced the added benefit of an automated combustion process with ideal combustion conditions to maximize efficiency and reduce the creation of pollutants.

31. Claims 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over '288 in view of '591.

32. '288 fails to disclose a reactor comprising a base portion communicating with and inclined towards a heated duct for collecting fluid slag, wherein the collecting duct communicates with a container for collecting the fluid slag which is cooled rapidly in a water bath with the formation of solid beads so as to form a dilute slurry, wherein the collecting duct comprises heating means for keeping the slag fluid. '591 teaches a reactor (10) comprising a base portion (12) communicating with and inclined towards a heated duct (10b) for collecting fluid slag (Col. 3, lines 25-38), wherein the collecting duct (10b) communicates with a container (12) for collecting the fluid slag which is cooled rapidly in a water bath with the formation of solid beads so as to form a dilute slurry (Col. 3, lines 25-38), wherein the collecting duct (10b) comprises heating means for keeping the slag fluid (Col. 3, lines 25-29). It would have been obvious for one skilled in the art at the time of invention to combine the combustion apparatus of '288 with the quench chamber of '591 because such a combination would have produced the added benefit of a means for disposing the liquid slag present in the combustion chamber in a safe and environmentally friendly way and would also have the added benefit of replacing the clean-out tube (17a, mistakenly as 7a in Fig. 1) of '288 with a

completely sealed quench chamber which would prevent potentially dangerous splashing of the liquid slag to occur.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David J. Laux whose telephone number is (571) 270-7619. The examiner can normally be reached on M-F 9:00-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Rinehart can be reached on (571) 272-4881. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. J. L./ October 22, 2010
Examiner, Art Unit 3743

/Kenneth B Rinehart/
Supervisory Patent Examiner, Art Unit 3743